

Application No. 10/027,006

Docket No.: M1912.0025

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A communication system using packet switching for conducting packet communication between a server and a client through a switching apparatus, wherein said switching apparatus

during relay of a packet to be transmitted from said server to said client, said switching apparatus rewrites header information of the packet in-question to have the contents which are to be set when the packet in-question is sent from said switching apparatus and sends said packet to said client, and

from the time of relay of a data acquisition request from said client until the end of transmission of a packet of an acknowledgement packet to be transmitted from said server to said client, said switching apparatus conducts a one-way splicing processing in the direction from the server in question to the client in question, as well as and successively conducting conducts retransmission control and flow control of communication in the direction from said client to said server.

2. (Currently Amended) The communication system as set forth in claim 1, wherein said switching apparatus ~~comprising~~ comprises:

a client side processing unit for accepting a connection from [[each]] said client to manage a connection with the client in question for transmitting and receiving a packet to and from the client,

a server side processing unit for accessing [[each]] said server to manage a connection with the server in-question for transmitting and receiving a packet to and from the server,

means for, during relay of [[a]] the packet to be transmitted from said server to said client, rewriting the header information of said packet to send said packet rewritten to said client, and

means for conducting one-way splicing in the direction from said server to the client in question, as well as and successively conducting retransmission control and flow control for communication in the direction from said client to said client side processing unit and

Application No. 10/027,006Docket No.: M1912.0025

communication in the direction from said server side processing unit to said server without cutting off an established connection.

3. (Currently Amended) The communication system as set forth in claim [[2,]] 1, wherein said switching apparatus comprises:

a client side processing unit for accepting a connection from said client to manage a connection with the client for transmitting and receiving a packet to and from the client, said client side processing unit including comprising:

a client side terminating unit for controlling a connection with [[each]] said client to accept a connection and a request from [[each]] said client, and

a client side updating unit for rewriting the header information of a packet to be transmitted from said server to said client to relay the rewritten packet, and

a server side processing unit for accessing said server to manage a connection with the server for transmitting and receiving a packet to and from the server, said server side processing unit including comprising:

a server side terminating unit for managing a connection with [[each]] said server to relay an instruction and data directed to [[each]] said server which are sent from said client side terminating unit, and

a server side updating unit for accepting a packet to be transmitted from [[each]] said server to [[each]] said client to send the packet to said client side updating unit.

4. (Currently Amended) The communication system as set forth in claim 3, wherein the header information of said packet including comprises:

a sequence number indicative of, in transmission data divided into individual packets, order of data in [[a]] the packet in question,

a data length of the packet in question, and

an Ack number indicative of a sequence number of data that a communication partner has already received.

Application No. 10/027,006Docket No.: M1912.0025

5. (Currently Amended) The communication system as set forth in claim 4, wherein the header information of said packet further includes comprises a Win value indicative of a remaining capacity of a reception buffer that the communication partner is yet to receive.

6. (Currently Amended) The communication system as set forth in claim [[2]] 3, wherein

said client side terminating unit including comprises means for notifying said client side updating unit and said server side terminating unit of header information of a packet received from [[each]] said client to said client side updating unit and said server side terminating unit, and

said server side updating unit including comprises means for notifying said server side terminating unit of header information of a packet to be transmitted from [[each]] said server to [[each]] said client to said server side terminating unit,

said client side updating unit and said server side terminating unit recording and referring records and refers to said notified header information to properly rewrite header information of the packet.

7. (Currently Amended) The communication system as set forth in claim 6, wherein at a state where said one-way splicing processing is set, said client side terminating unit instructs said client side updating unit to conduct acknowledgement processing in response to a packet received from [[each]] said client, and

said client side updating unit including comprises means for receiving an instruction of said acknowledgement processing to generate and send a packet of an acknowledgement packet to the client in question.

8. (Currently Amended) The communication system as set forth in claim [[2]] 3, wherein said server side updating unit

relays transmission of packets from a plurality of [[said]] servers directed to [[one]] said client, and

Application No. 10/027,006Docket No.: M1912.0025

includes comprises means for removing, from header information of a packet at least one of the packets to be relayed, a flag indicative of the end of transmission of the packet at individual said server at least one of the packets at one of the plurality of servers,

thereby relaying a packet transmitted by the switching of said plurality of servers to said client without cut-off of a connection with said client.

9. (Currently Amended) The communication system as set forth in claim [[2]] 3, wherein said client side terminating unit and said server side terminating unit including comprise means for restoring transmission data to be transmitted in individual divisional divided packets from said client to said server to an original state prior to the division dividing the transmission data so as to selectively transmit each packet to the server.

10. (Currently Amended) The communication system as set forth in claim [[2]] 3, further comprising an analysis unit for determining a corresponding server as a connection destination to which [[each]] said client connects, said analysis unit including comprising:

means for obtaining, from said client side terminating unit, information of a request sent by said client to [[each]] said server,

means for determining [[a]] the corresponding server as a connection destination to which the client in question is to connect based on said request, and

means for instructing said server side terminating unit to connect the client in question with said corresponding server determined as a connection destination.

11. (Currently Amended) The communication system as set forth in claim 10, wherein said client side terminating unit and said server side terminating unit including comprise means for restoring transmission data to be transmitted in individual divisional divided packets from said client to said server to an original state prior to the division dividing the transmission data and then transmitting the restored packet to the server in question, and

said analysis unit including comprises means for determining said corresponding server as a connection destination based on said transmission data restored to the original state prior to the division dividing the transmission data.

Application No. 10/027,006Docket No.: M1912.0025

12. (Currently Amended) The communication system as set forth in claim 10, wherein said analysis unit including further comprises:

means for sequentially classifying data acquisition requests yet to be processed which are issued by said client into groups according to corresponding servers as connection destinations, and

means for instructing, based on each of said classified group basis groups, said server side terminating unit to set up a connection to a corresponding server and execute said data acquisition requests classified into the group in question groups.

13. (Currently Amended) The communication system as set forth in claim 10, wherein said analysis unit including further comprises:

means for sequentially classifying data acquisition requests yet to be processed which are issued by said client into groups according to corresponding servers as connection destinations, and

means for instructing, based on each of said classified group basis groups, said server side terminating unit to set up a connection to a corresponding server, execute said data acquisition requests classified into the group in question groups and cut off the connection with the corresponding server after the transmission of the acquisition request.

14. (Currently Amended) A switching apparatus for relaying packet communication through a communication network between a plurality of servers and clients, wherein said switching apparatus

during relay of a packet to be transmitted from said server to said client, one of the plurality of servers to one of the plurality of clients, said switching apparatus rewrites header information of the packet in question to have the contents which are to be set when the packet in question is sent from the switching apparatus and sends said packet to said client, and

from the time of relay of a data acquisition request from said client until the end of transmission of a packet of an acknowledgement packet to be transmitted from said server to said client, said switching apparatus conducts one-way splicing processing in the direction from the server in question to the client in question, as well as successively conducting

Application No. 10/027,006Docket No.: M1912.0025

retransmission control and flow control of communication in the direction from said client to said server.

15. (Currently Amended) The switching apparatus as set forth in claim 14, comprising:

a client side processing unit for accepting a connection from [[each]] said client to manage a connection with the client ~~in question~~ for transmitting and receiving a packet to and from the client,

a server side processing unit for accessing [[each]] said server to manage a connection with the server ~~in question~~ for transmitting and receiving a packet to and from the server,

means for, during relay of a packet to be transmitted from said server to said client, rewriting header information of said packet to send said packet rewritten to said client, and

means for conducting one-way splicing in the direction from said server to the client ~~in question~~, as well as successively conducting retransmission control and flow control for communication in the direction from said client to said client side processing unit and communication in the direction from said server side processing unit to said server without cutting off an established connection.

16. (Currently Amended) The switching apparatus as set forth in claim 15,
wherein said client side processing unit including comprises:

a client side terminating unit for managing a connection with each said client of the plurality of clients to accept a connection and a request ~~from each said client therefrom~~, and

a client side updating unit for rewriting header information of a packet to be transmitted from said server to said client to relay the rewritten packet, and
wherein said server side processing unit including comprises:

a server side terminating unit for managing a connection with each said server of the plurality of servers to relay an instruction and data directed to each said server plurality of servers which are sent from said client side terminating unit, and

Application No. 10/027,006Docket No.: M1912.0025

a server side updating unit for accepting a packet to be transmitted from each said server of the plurality of servers to each said client of the plurality of clients to send the packet to said client side updating unit.

17. (Currently Amended) The switching apparatus as set forth in claim 16, wherein the header information of said packet including comprises:

a sequence number indicative of, in transmission data divided into individual packets, order of data in [[a]] the packet in question,

a data length of the packet in question, and

an Ack number indicative of a sequence number of data that a communication partner has already received.

18. (Currently Amended) The switching apparatus as set forth in claim 17, wherein the header information of said packet further includes comprises a Win value indicative of a remaining capacity of a reception buffer that the communication partner is yet to receive.

19. (Currently Amended) The switching apparatus as set forth in claim [[15]] 16, wherein

said client side terminating unit includes comprises means for notifying said client side updating unit and said server side terminating unit of header information of a packet received from each said client to said client side updating unit and said server side terminating unit, and

said server side updating unit includes comprises means for notifying said server side terminating unit of header information of a packet to be transmitted from [[each]] said server to [[each]] said client to said server side terminating unit,

said client side updating unit and said server side terminating unit recording and referring record and refer to said notified header information to properly rewrite the header information of the packet.

20. (Currently Amended) The switching apparatus as set forth in claim 19, wherein

Application No. 10/027,006Docket No.: M1912.0025

at a state where said one-way splicing processing is set, said client side terminating unit instructs said client side updating unit to conduct acknowledgment processing in response to a packet received from [[each]] said client, and

said client side updating unit including comprises means for accepting an instruction of said acknowledgement processing to generate and send a packet of an acknowledgement packet to the client in question.

21. (Currently Amended) The switching apparatus as set forth in claim [[15]] 16, wherein said server side updating unit

relays transmission of packets from a plurality of said servers directed to [[one]] said client, and

includes comprises means for removing, from header information of a packet to be relayed, a flag indicative of the end of transmission of [[a]] the packet at individual said server each of said plurality of the servers,

thereby relaying a packet transmitted by the switching of said plurality of the servers to said client without cut-off of a connection with said client.

22. (Currently Amended) The switching apparatus as set forth in claim [[15]] 16, wherein said client side terminating unit and said server side terminating unit include comprise means for restoring transmission data to be transmitted in individual divisional divided packets from said client to said server to an original state prior to the division dividing the transmission data so as to selectively transmit each packet to the server.

23. (Currently Amended) The switching apparatus as set forth in claim [[15]] 16, further comprising an analysis unit for determining a corresponding server as a connection destination to which [[each]] said client connects, wherein said analysis unit including comprises:

means for obtaining, from said client side terminating unit, information of a request sent by said client to [[each]] said server,

means for determining [[a]] the corresponding server as a connection destination to which the client in question is to connect based on said request, and

Application No. 10/027,006Docket No.: M1912.0025

means for instructing said server side terminating unit to connect the client in question with said corresponding server determined as a connection destination.

24. (Currently Amended) The switching apparatus as set forth in claim 23, wherein said client side terminating unit and said server side terminating unit include comprise means for restoring transmission data to be transmitted in individual divisional divided packets from said client to said server to an original state prior to the division dividing the transmission data and then transmitting the restored packet to the server in question, and

said analysis unit includes comprises means for determining said corresponding server as a connection destination based on said transmission data restored to the original state prior to the division dividing the transmission data.

25. (Currently Amended) The switching apparatus as set forth in claim 23, wherein said analysis unit including comprises:

means for sequentially classifying data acquisition requests yet to be processed which are issued by said client into groups according to corresponding servers as connection destinations, and

means for instructing, based on each of said classified group basis groups, said server side terminating unit to set up a connection to a corresponding server and execute said data acquisition requests classified into the group in question groups.

26. (Currently Amended) A packet switching method of a switching apparatus for relaying packet communication through a communication network between a plurality of servers and clients, the method comprising the steps of:

during relay of a packet to be transmitted from said server to said client one of the plurality of servers to one of the plurality of clients, rewriting header information of the packet in question to have the contents which are to be set when the packet in question is sent from the switching apparatus and sending said packet to said client, and

from the time of relay of a data acquisition request from said client until the end of transmission of a packet of an acknowledgement packet to be transmitted from said server to said

Application No. 10/027,006Docket No.: M1912.002S

client, conducting one-way splicing processing in the direction from the server ~~in question~~ to the client ~~in question~~, as well as successively conducting retransmission control and flow control of communication in the direction from said client to said server.

27. (Currently Amended) The packet switching method as set forth in claim 26, further comprising ~~the steps of~~ :

managing a connection with [[each]] said client to accept a connection and a request from [[each]] said client,

rewriting header information of a packet to be transmitted from said server to said client to relay the rewritten packet, and

managing a connection with [[each]] said server to relay an instruction and data directed to [[each]] said server ~~which are and~~ sent from said client,

wherein the header information of said packet ~~includes~~ comprises:

a sequence number indicative of, in transmission data divided into individual packets, order of data in [[a]] the packet ~~in question~~,

a data length in and below a transport layer of the packet ~~in question~~,

an Ack number indicative of a sequence number of data that a communication partner has already received, and

a Win value indicative of a remaining capacity of a reception buffer that the communication partner is yet to receive.

28. (Currently Amended) The packet switching method as set forth in claim 27, further comprising ~~the steps of~~ :

relaying transmission of packets from a plurality of said servers directed to one of said ~~client~~ clients, and

removing, from header information of a ~~packet~~ at least one of the packets to be relayed, a flag indicative of the end of transmission of a ~~packet~~ at individual said server the at least one of the packets at one of the plurality of said servers,

Application No. 10/027,006Docket No.: M1912.0025

thereby relaying a packet transmitted by the switching of said plurality of the servers to said client without cut-off of a connection with said client.

29. (Currently Amended) The packet switching method as set forth in claim 27, further comprising ~~the steps of~~ restoring transmission data to be transmitted in individual divisional divided packets from said client to said server to an original state prior to ~~the division dividing the transmission data so as~~ to selectively transmit each packet to the server.

30. (Currently Amended) The packet switching method as set forth in claim 27, further comprising ~~the steps of~~ :

obtaining information of a request to be transmitted by said client to [[each]] said server,

determining a corresponding server as a connection destination to which the client in question is to connect based on said request, and

giving an instruction to connect the client in question with said corresponding server determined as a connection destination,

thereby determining a corresponding server as a connection destination to which [[each]] said client is to connect.

31. (Currently Amended) The packet switching method as set forth in claim 30, further comprising ~~the steps of~~ :

sequentially classifying data acquisition requests yet to be processed which are issued by said client into groups according to corresponding servers as connection destinations, and

giving an instruction, based on each of said classified group basis groups, to set up a connection to [[a]] each of the corresponding server servers and execute said data acquisition requests classified into the group in question groups.

32. (Currently Amended) A switching program for relaying packet communication through a communication network between a plurality of servers and clients by ~~the control of using a computer, the program comprising the functions of~~ :

Application No. 10/027,006Docket No.: M1912.0025

during relay of a packet to be transmitted from said server to said client one of said servers to one of said clients, rewriting header information of the packet in question to have the contents which are to be set when the packet in question is sent from said switching apparatus and sending said packet to said client, and

from the time of relay of a data acquisition request from said client until the end of transmission of a packet of an acknowledgement packet to be transmitted from said server to said client, conducting one-way splicing processing in the direction from the server in question to the client in question, as well as successively conducting retransmission control and flow control of communication in the direction from said client to said server.

33. (Currently Amended) The switching program as set forth in claim 32, further comprising the functions of:

managing a connection with [[each]] said client to accept a connection and a request from [[each]] said client,

rewriting header information of a packet to be transmitted from said server to said client to relay the rewritten packet, and

managing a connection with [[each]] said server to relay an instruction and data directed to [[each]] said server which are sent from said client,

wherein the header information of said packet including comprises:

a sequence number indicative of, in transmission data divided into individual packets, order of data in [[a]] the packet in question,

a data length in and below a transport layer of the packet in question,

an Ack number indicative of a sequence number of data that a communication partner has already received, and

a Win value indicative of a remaining capacity of a reception buffer that the communication partner is yet to receive.

34. (Currently Amended) The switching program as set forth in claim 33, further comprising the functions of:

Application No. 10/027,006Docket No.: M1912.0025

relaying transmission of packets from a plurality of said servers directed to one of said client clients, and

removing, from header information of a packet to be relayed, a flag indicative of the end of transmission of [[a]] the packet at individual said server each of the plurality of said servers,

thereby relaying a packet transmitted by the switching of said plurality of the servers to said client one of the clients without cut-off of a connection with said client one of the clients.

35. (Currently Amended) The switching program as set forth in claim 33, further comprising the functions of restoring transmission data to be transmitted in individual divisional divided packets from said client to said server to an original state prior to the division to dividing the transmission data so as to selectively transmit each packet to the server.

36. (Currently Amended) The switching program as set forth in claim 33, further comprising the functions of :

obtaining information of a request to be transmitted by said client to [[each]] said server,

determining a corresponding server as a connection destination to which the client in question connects based on said request, and

giving an instruction to connect the client in question with said server determined as a connection destination,

thereby determining [[a]] the corresponding server as a connection destination to which [each] said client is to connect.

37. (Currently Amended) The switching program as set forth in claim 36, further comprising the functions of :

sequentially classifying data acquisition requests yet to be processed which are issued by said client into groups according to corresponding servers as connection destinations, and

Application No. 10/027,006Docket No.: M1912.0025

~~give giving~~ an instruction, based on each of said classified group basis groups, to set up a connection to a corresponding server and execute said data acquisition requests classified into the group in question groups.

38. (Currently Amended) A switching program operating on a server in a communication system for conducting packet communication between a server and a client through a switching apparatus by the control of using a computer on the server, the program comprising the function of, :

from the time of relay of a data acquisition request from said client by said switching apparatus until the end of transmission of a packet of an acknowledgement packet to be transmitted to said client, transmitting said packet to the client in question by one-way splicing.

39. (Currently Amended) A switching program operating on a client in a communication system for conducting packet communication between a server and a client through a switching apparatus by the control of using a computer on the client, the program comprising the function of, :

from the time of relay of a data acquisition request to said server by said switching apparatus until the end of transmission of a packet of an acknowledgement packet to be received from said server, receiving said packet from the server in question by one-way splicing.

40. (Currently Amended) A server in a communication system for conducting packet communication between a server and a client through a switching apparatus, wherein

from the time of relay of a data acquisition request from said client by said switching apparatus until the end of transmission of a packet of an acknowledgement packet to be transmitted to said client, said server transmits said packet to the client in question by one-way splicing.

41. (Currently Amended) The server as set forth in claim 40, wherein to said client, said server transmits said packet with header information rewritten to have the contents to be set when the packet in question is transmitted from said switching apparatus.

Application No. 10/027,006Docket No.: M1912.0025

42. (Currently Amended) The server as set forth in claim 41, wherein the header information of said packet including comprises:

a sequence number indicative of, in transmission data divided into individual packets, order of data in [[a]] the packet in question,

a data length of the packet in question, and

an Ack number indicative of a sequence number of data that a communication partner has already received.

43. (Currently Amended) The server as set forth in claim 42, wherein the header information of said packet further includes comprises a Win value indicative of a remaining capacity of a reception buffer that the communication partner is yet to receive.

44. (Currently Amended) The server as set forth in claim 41, wherein
said switching apparatus relays transmission of packets from a plurality of [[said]] servers directed to one [[said]] client, and

from header information of a packet to be relayed, a flag is removed which is indicative of the end of transmission of [[a]] the packet at individual said server each of the plurality of servers,

thereby relaying a packet transmitted by the switching of said plurality of servers to said client without cut-off of a connection with said client.

45. (Currently Amended) The server as set forth in claim 41, wherein the transmission data to be transmitted in individual divisional divided packets from said client is restored to an original state prior to the division, whereby each packet restored is received by a selected server.

46. (Currently Amended) The server as set forth in claim 41, wherein
a corresponding server as a connection destination to which [[each]] said client is to connect is determined by said switching apparatus,

information of a request to be transmitted by said client to [[each]] said corresponding server is obtained by said switching apparatus,

Application No. 10/027,006Docket No.: M1912.0025

a server as a connection destination to which the client in question is to connect is determined based on said request, and

an instruction to connect the client in question with said corresponding server determined as a connection destination is given.

47. (Currently Amended) The server as set forth in claim 46, wherein data acquisition requests yet to be processed which are issued by said client are sequentially classified into groups as set forth in corresponding servers as connection destinations, and

based on each of said classified group basis groups, an instruction is given to set up a connection to a corresponding server and execute said data acquisition requests classified into the group in question groups.

48. (Currently Amended) A client in a communication system for conducting which conducts packet communication between a server and a client through a switching apparatus, wherein

from the time of relay of a data acquisition request to said server by said switching apparatus until the end of transmission of a packet of an acknowledgement packet to be received from said server, said client receives said packet from the server in question by one-way splicing.

49. (Currently Amended) The client as set forth in claim 48, wherein said client receives from said server, said packet with header information rewritten to have the contents to be set when the packet in question is transmitted from said switching apparatus.

50. (Currently Amended) The client as set forth in claim 49, wherein the header information of said packet including comprises:

a sequence number indicative of, in transmission data divided into individual packets, order of data in [[a]] the packet in question,

a data length of the packet in question, and

Application No. 10/027,006Docket No.: M1912.0025

an Ack number indicative of a sequence number of data that a communication partner has already received.

51. (Currently Amended) The client as set forth in claim 50, wherein the header information of said packet further includes comprises a Win value indicative of a remaining capacity of a reception buffer that the communication partner is yet to receive.

52. (Currently Amended) The client as set forth in claim 49, wherein said switching apparatus relays transmission of packets from a plurality of [[said]] servers directed to one [[said]] client, and

from header information of a packet to be relayed, a flag is removed which is indicative of the end of transmission of [[a]] the packet at individual said server each of the plurality of servers,

thereby relaying a packet transmitted by the switching of said plurality of servers to said client without cut-off of a connection with said client.

53. (Currently Amended) The client as set forth in claim 49, wherein the transmission data to be transmitted in individual divisional divided packets from said client is restored to an original state prior to the division dividing the transmission data and each packet restored is transmitted to a selected server.

54. (Currently Amended) The client as set forth in claim 49, wherein a corresponding server as a connection destination to which [each] said client is to connect is determined by said switching apparatus,

information of a request to be transmitted by said client to [each] said server is obtained by said switching apparatus,

[[a]] the corresponding server as a connection destination to which the client in question is to connect is determined based on said request, and

an instruction to connect the client in question with said corresponding server determined as a connection destination is given.

Application No. 10/027,006Docket No.: M1912.0025

55. (Currently Amended) The client as set forth in claim 54, wherein data acquisition requests yet to be processed which are issued by said client are sequentially classified into groups according to corresponding servers as connection destinations, and

based on each of said classified group basis groups, an instruction is given to set up a connection to a corresponding server and execute said data acquisition requests classified into the group in question groups.